$y = x^2$

Since $(\ )^2$ and $\sqrt{}$ are inverses

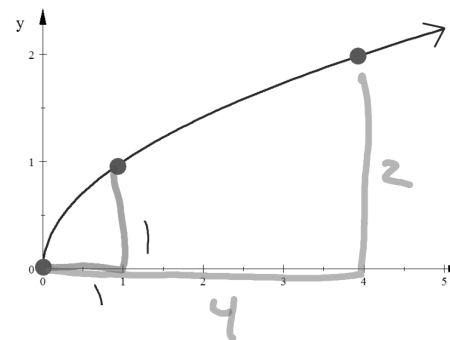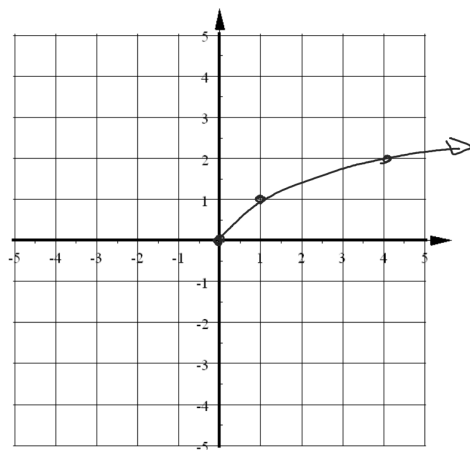why is the graph of $\sqrt{}$ only half of a sideways parabola.

$y = \sqrt{x}$ Why is the graph of the above only "half a sideways parabola"?

- If it were both halves then it wouldn't be a function.
- Without a sign in front of the radical it means the Principal Square Root (positive root).

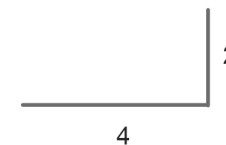Graph of the Parent Function:

$y = \sqrt{x}$

x	y
0	0
1	1
4	2

First "Good Point"

1, 1

Second "Good Point"

4, 2

What do you think $y = \sqrt{x-3}$ looks like?

The parent function shifted 3 units right

What do you think $y = \sqrt{x} + 7$ looks like?

The parent function shifted 7 units up

What do you think $y = -\sqrt{x}$ looks like?

The parent function upside down

What do you think $y = 3\sqrt{x}$ looks like?

The parent function 3 times taller

$$y = a\sqrt{x-h} + k$$

The "vertex"

h: Horizontal Translation   (h,k)

k: Vertical Translation

                                The new starting point
a: or
      a>1 Vertical Stretch   The new origin

      0<a<1 Vertical Shrink

      a is neg: x-axis reflection
      (upside down)

When we graphed parabolas we
   • shifted them left/right and up/down
   • made them taller and shorter
   • made them upside down (x-axis reflection)

What didn't we do?
     make them backwards (y-axis reflection)

Why not?
Since a parabola is already symmetric about a
vertical line a y-axis reflection won't change it.

Since $y = \sqrt{x}$ isn't symmetric about the y-axis you can make it backwards.
How do you do a y-axis reflection?

Graph a backward square root function.

$$y = \sqrt{-x}$$

Write the equation of the parent square root function after a y-axis reflection and moving it 3 left.

$$y = \sqrt{-(x+3)}$$

When you have both a Horizontal Translation and a y-axis reflection you must use PARENTHESES to separate the two transformations

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The shapes of the square root function:

A	B
x-axis reflection	Parent function

C	D
x & y axis reflection	· y-axis reflection
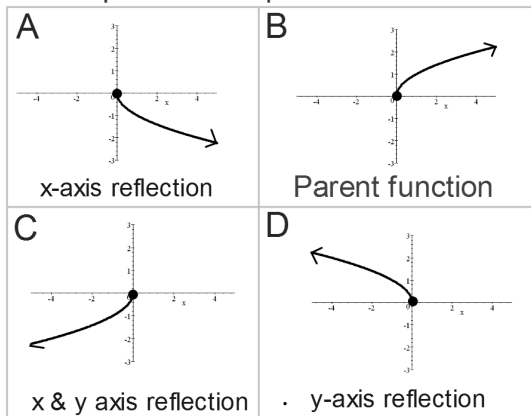
Match the graphs with the equations

1. $y = -\sqrt{-x}$ C
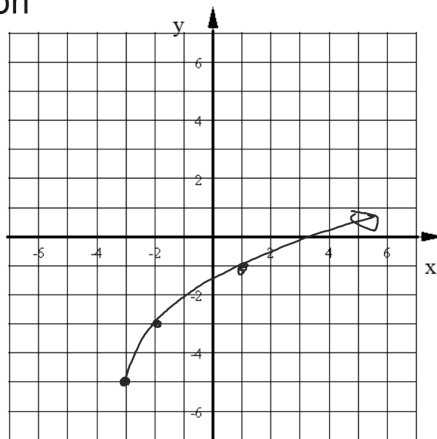
2. $y = \sqrt{x}$ B

3. $y = -\sqrt{x}$ A

4. $y = \sqrt{-x}$ D

Get a sheet of graph paper.

Graph this square root function

$$y = 2\sqrt{x+3} - 5$$

5 down

3 Left

Twice as Tall

1ST Good pt :

$\underline{\quad}|1 \longrightarrow \underline{\quad}|2$
$\quad 1 \qquad\qquad 1$

2nd good pt

$\underline{\quad}|2 \longrightarrow \underline{\quad}|4$
$\quad 4 \qquad\qquad 4$

Graph this square root function

$$y = -3\sqrt{x-1} + 3$$

3 up

1 RT

3x taller

upside down

1ST Good PT

$\underline{\quad}|1 \longrightarrow \underline{\quad}|^{1}_{-3}$
$\quad 1$

2nd good pt:

$\underline{\quad}|2 \longrightarrow \underline{\quad}|^{4}_{-6}$
$\quad 4$

Graph this square root function

$$y = 2\sqrt{-(x-5)} - 2$$

2 Down

5 RT

Backwards

Twice as tall

1ST GOOD PT:

$\underline{\quad}|1 \longrightarrow \quad 2\underline{\quad}|_{-1}$
$\quad 1$

2nd good pt

$\underline{\quad}|2 \longrightarrow {}^{4}\underline{\quad}|_{-4}$
$\quad 4$
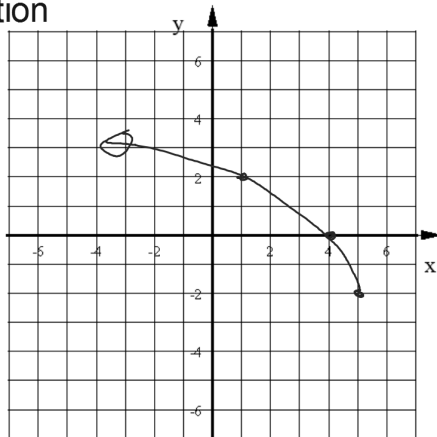
Write the equation of this function

3 RT   4 DOWN

upside down

TWICE as tall

$$y = -2\sqrt{x-3} - 4$$